DESCRIPTION OF MAP UNITS

BELT NE 7.5-MINUTE QUADRANGLE, MONTANA

Qal FLOOD PLAIN AND CHANNEL ALLUVIUM (HOLOCENE)--Yellowish-brown and gray gravel, sand, silt and clay deposited in flood plains and channels. Deposits are well to poorly stratified and moderately well sorted. Thickness not measured; estimated to be as much as 5 m (15 ft).

Qls LANDSLIDE DEPOSITS (HOLOCENE)--Slump and earthflow deposits that may be stable or unstable chaotic mixtures of clay to boulder-size clasts or rotated blocks of bedrock that have retained internal integrity. Color, texture and lithology reflect that of parent rock. Thickness not measured; estimated to be as much as 60 m (200 ft) but generally less than 30 m (100 ft).

Qat ALLUVIAL TERRACE DEPOSITS (HOLOCENE)--Light-brown to light-gray, crudely to well stratified and moderately to well sorted sand and gravel present from 12 to 24 m (40 to 80 ft) above Little Belt and Big Willow creeks. Thickness generally less than 3 m (10 ft).

Qcl COLLUVIUM AND SHEETWASH ALLUVIUM (HOLOCENE and PLEISTOCENE?)--Poorly to moderately well sorted, fine-grained sand, silt and clay deposited on slopes. Color and lithology reflect that of parent rock. Includes significant component of windblown silt and sand and may include glacial lake deposits locally. Thickness not measured; estimated to be as much as 4.5 m (15 ft).

Qgl — GLACIAL LAKE DEPOSITS (PLEISTOCENE)--Dark-gray, brownish-gray and reddish-brown massive, laminated or varved clay, silt and sand below an altitude of 1200 m (4000 ft) that contains scattered granules, pebbles, and rarely cobbles and boulders.

Ta — ALLUVIAL TERRACE DEPOSITS (PLIOCENE?)--Light-brown to light-gray crudely to well stratified and well sorted locally well cemented deposits of coarse sand and gravel. Thickness of deposit as much as 12 m (40 ft) but generally 6 m (20 ft).

COLORADO GROUP

MARIAS RIVER SHALE

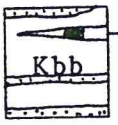
Kmfe — FERDIG MEMBER (UPPER CRETACEOUS, TURONIAN)--Noncalcareous, dark-gray-weathering fissile shale that contains lenticular-bedded siltstone and fine-grained sandstone and distinctive reddish-orange or reddish-brown ferruginous dolostone concretions that weather into small chips. A fine-grained, planar-bedded sandstone is present from 12 to 24 m (40 to 80 ft) above the base of the member. Top of member not exposed in map area. In adjacent areas, thickness approximately 61 m (200 ft).

Kmc — CONE MEMBER (UPPER CRETACEOUS, CENOMANIAN and TURONIAN)--Lower dark-gray weathering calcareous shale that contains a persistent bentonite bed in the lower part, and upper thin beds of platy, medium-gray- or grayish-orange-weathering

petroliferous limestone, that contains blue fish scales and pelecypod fragments. Thickness of member approximately 24 m (80 ft).

Kmfl FLOWEREE MEMBER (UPPER CRETACEOUS, CENOMANIAN)--Dark-gray-weathering fissile shale that contains light-yellowish-gray, low-swelling bentonite beds and several thin beds of siltstone and fine-grained sandstone, some of which are wavy- and lenticular-bedded. Locally contains septarian concretions and limonitic dolostone concretions that weather to small chips. Thickness of member approximately 18 m (60 ft).

BLACKLEAF FORMATION



BOOTLEGGER MEMBER (LOWER CRETACEOUS, ALBIAN)--Dark-gray-weathering fissile shale that contains two to six relatively prominent sandstone beds about 3 to 12 m (10 to 40 ft) thick separated by 15 to 30 m (50 to 100 ft) of shale that contains numerous bentonite beds. The fine- to medium-grained light-brown- to moderate-yellowish-brown-weathering sandstones are commonly flaser-bedded or ripple-laminated with abundant trace fossils on bedding surfaces. Trough and hummocky bedding also occur higher in the section, and fish scales and bones are common in the upper sandstones. Locally the tops of sandstone beds contain black chert pebbles. A well cemented chert-pebble conglomerate, or coarse-grained sandstone occurs at the top of the member. Sandstone beds persist over many square kilometers. The basal sandstone in the southern part of the

map does not occur in the northern part. A bed of porcellanite and bentonite occurs locally in the upper part of the formation and is labeled Arrow Creek Bed on the map. Thickness of member ranges from 67 to 150 m (220 to 480 ft).

Kbv — VAUGHN MEMBER (LOWER CRETACEOUS, ALBIAN)--Bentonite beds and very bentonitic, silty medium-gray-weathering shale with several moderate-brown-weathering, medium-grained, trough-crossbedded sandstone beds and abundant plant fragments in the northern part of the map. Carbonaceous shale or lignite occur in the upper part. Thickness of member ranges from 0 to 30 m (100 ft).

Kbt — TAFT HILL MEMBER (LOWER CRETACEOUS, ALBIAN)--Medium-dark-gray- to medium-light-gray-weathering, bentonitic, silty shale with several thin, locally glauconitic sandstone beds. Thickness of member approximately 34 m (110 ft).

Kbf — FLOOD MEMBER (LOWER CRETACEOUS, ALBIAN)--Black to dark-gray-weathering fissile shale that contains pods and lenses of bioturbated sandstone at its base. Lacks the two prominent sandstone beds present in Great Falls area to west. Thickness of member approximately 40 m (130 ft).

base of Colorado Group

KOOTENAI FORMATION

Kk_5 — FIFTH MEMBER (informal map unit) (LOWER CRETACEOUS, APTIAN AND

ALBIAN?)--Dominantly moderate-red mudstone that contains lenses of sandstone and limestone. The uppermost part of the member consists of massive, color-banded, greenish-gray, grayish-red-purple, moderate-red and very dark-red mudstone with lenses of fine- to medium-grained, trough-crossbedded, greenish-gray-weathering sandstone. Thickness of member approximately 37 m (120 ft).

Kk_4 FOURTH MEMBER (informal map unit) (LOWER CRETACEOUS, APTIAN)--Dusky-red or pale-reddish-brown, fine- to medium-grained, thin- to medium-bedded, micaceous, argillaceous, platy-bedded sandstone with abundant plant fragments interbedded with very dark-red mudstone. A persistent ostracod-rich, moderate-reddish-brown limestone bed occurs in the middle of the member. Basal contact is transitional with Third member and contains interbedded gray or dusky-red siltstone and mudstone. Lowest sandstone beds are light-brown- or moderate-yellowish-brown-weathering, becoming dusky-red- or pale-reddish-brown-weathering higher in the section. Low amplitude ripple marks, that are locally interference ripples commonly occur on bedding surfaces. Base of member not exposed in map area. In adjacent areas, thickness of member approximately 30 m (100 ft).

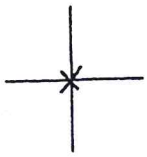
MAP SYMBOLS

CONTACT--Dashed where approximately located; short-dashed where inferred.

FAULT--Showing relative displacement: U on upthrown side; D on downthrown side. Dashed where approximately located. Queried where uncertain.

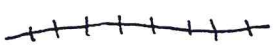
DIP OF BEDDING--Showing direction and amount of dip; interpreted from aerial photographs or map patterns where no dip amount shown.

ANTICLINE--Showing trace of crestline and direction of plunge.



DEPRESSION--Center at X.

DIKE (EOCENE)--Alkalic intrusive with high-angle attitude and thickness typically less than 4 m (13 ft).



SILL (EOCENE)--Alkalic intrusive that parallels or subparallels bedding.

SILL (EOCENE)--Alkalic intrusive at base of sandstone bed.

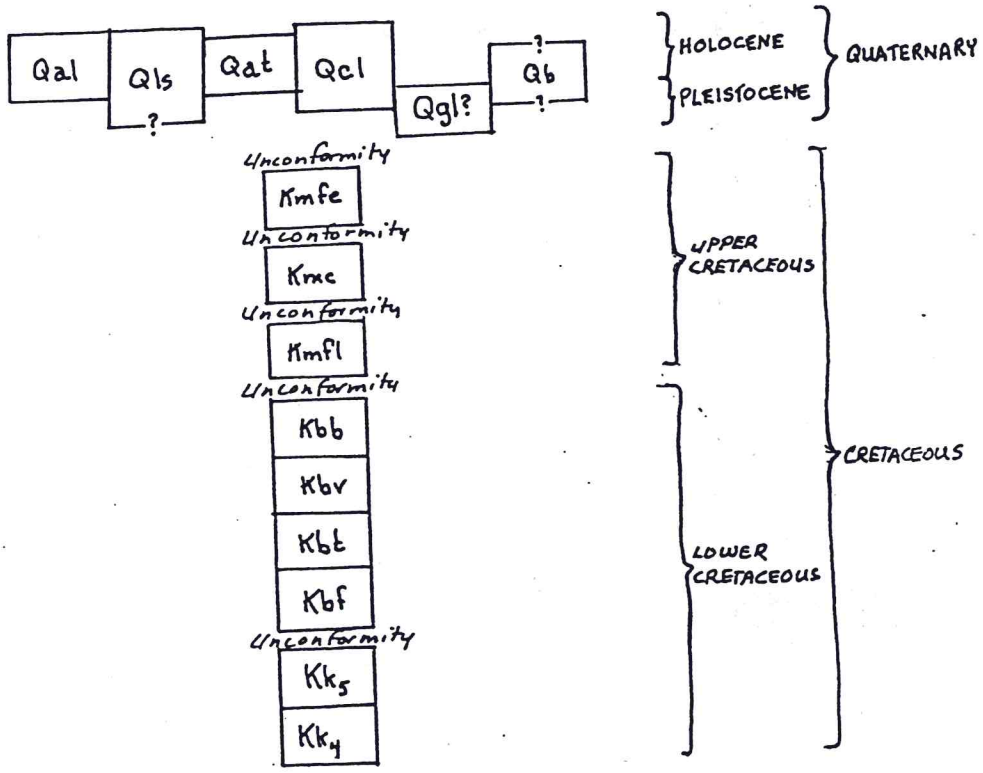
SILL (EOCENE)--Alkalic intrusive on top of sandstone bed.

SANDSTONE BED--Thickness approximate, not all sandstone beds shown on map. Dashed where approximately located. Queried at limit of mapping.

PORCELLANITE or PORCELLANITE and BENTONITE BED (CRETACEOUS)--Arrow Creek Bed, labeled on map, occurs in the Bootlegger Member of the Blackleaf Formation.

CORRELATION OF MAP UNITS

BELT NE 7.5-MINUTE QUADRANGLE



PREVIOUS GEOLOGIC MAPPING, BELT NE 7.5-MINUTE QUADRANGLE

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